914 Photomultiplier Detection System

OPERATION MANUAL

Photon Technology International

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PTI Standard Instrument Warranty

Warranty Period and Extent

Photon Technology International (PTI) warrants that its instruments will be delivered in a functional state and free from defect, and will meet stated specifications for a period of one (1) year. The warranty period will start on the date of shipment by PTI. In case of systems that include installation by PTI, the warranty will start from the date of installation or thirty (30) days after the shipping date, whichever is earlier.

This warranty is in lieu of all other warranties, expressed or implied, including, without limitation, the implied warranties of merchantability and fitness for a particular purpose, nor will PTI provide training on its use free of charge. PTI shall not be responsible for any liability, loss or damages, caused or alleged to be caused, by the system, as a result of use or operation including, without limitation, consequential damages and loss of profit.

Specific Exclusions and Limitations

1. It is recognized that the performance of consumable items will diminish as a function of use, and that it may be necessary to replace such items to restore the stated specifications. Consumable items (arc lamps, filters, cuvettes, lenses, etc.) are not covered by the warranty.
2. The original manufacturer's warranty will be maintained for major system components not manufactured by PTI (e.g. computers, printers, microscopes, cameras and components thereof).
3. Fiber optic bundles are not covered by the warranty.
4. The use of arc lamps not supplied by PTI (or approved in writing by PTI) will void PTI's warranty on all illuminator subsystem components.
5. If there is any evidence of physical contact with coated optics (e.g. fingerprints), the warranty on that item will be voided.
6. If the optical components are realigned by the customer without specific permission from PTI, the warranty will be voided. Please note that the customer is responsible for changing lamps and aligning the lamp after installation. Aligning the lamp will not void the warranty unless other exclusions are applicable (nos. 4 and 5).
7. Instrument systems that are not authorized to be installed by anyone other than PTI service personnel will not be warranted.
8. In case of systems that include installation as part of the original purchase, unpacking the instrument by anyone other than PTI personnel will void the warranty.
9. Moving systems to another site within a facility or to another location, without specific permission from PTI, will void the warranty.
10. Damage or loss caused by shipping is not covered by the warranty.
11. Damage caused by improper operation of the instrument will void the warranty.
12. Damage caused by equipment not purchased from PTI that is attached to the instrument is not covered by the warranty.
13. Warranty is valid only in the state, province or country of the original purchase.
14. Warranty is valid only on systems having a computer supplied by PTI.
15. Software upgrades performed on the PTI computer workstation (e.g., adding word processors, image editors, etc.) not authorized by PTI will void the warranty.
16. Hardware upgrades performed on the PTI computer workstation (e.g., adding network boards, sound cards, etc.) not authorized by PTI will void the warranty.

Warranty Returns

A Return Material Authorization (RMA) Number must be obtained from the PTI Service Department before any items can be shipped to the factory. Returned goods will not be accepted without an RMA Number. Customer will bear all shipping charges for warranty repairs. All goods returned to the factory for warranty repair should be properly packed to avoid damage and clearly marked with the RMA Number.

Warranty Repairs

Warranty repairs will be done either at the customer's site or at the PTI plant, at our option. All service rendered by PTI will be performed in a professional manner by qualified personnel.

Software

PTI makes no warranties regarding either the satisfactory performance of the software or the fitness of the software for any specific purpose. PTI shall not be responsible for any liability, loss or damages caused or alleged to be caused by our software as a result of its use, including, without limitation, consequential damages and loss of profit, nor will PTI provide training on its use free of charge.

Safety Symbols Used In This Manual

(NOTE: Not all may be present in this manual)

(DANGER)

This symbol indicates the potential for serious bodily harm. Extreme care should be taken when performing the task and all warnings should be strictly adhered to. All possible steps should be taken to ensure safety.

(WARNING)

This symbol represents the potential for electrical shock and/or other bodily harm. Care should be taken when performing the task. There is also the potential for damage to equipment if warnings are not taken seriously.

(CAUTION)

This symbol represents the potential for equipment damage. The user is expected to use care when performing the task.

(RADIATION)

This symbol represents the risk of UV radiation. User must take all appropriate steps to protect eyes and exposed areas of the skin.

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1. Introduction

Congratulations on purchasing your new photomultiplier detection system from Photon Technology International. This instrument was designed and built by PTI to offer you the highest quality possible. The PTI Model 914 photomultiplier detection system is a combined digital (photon counting) and analog detection system consisting of an integrated photomultiplier tube (PMT) housing that includes high voltage supply, controls and signal processing circuitry. Various tubes are available to suit a variety of detection needs, and are easily installed within minutes. The 914 accepts 28 mm (1⅛-inch) diameter side-on PMTs.

Digital (photon counting) mode is selected by a TTL low signal on the Analog/Digital select line. This is the default mode. The PMT digital high voltage is factory set. No external control is required for digital mode.

Analog mode is set by applying a TTL high signal (+3.5 to + 5 V) on the Analog/Digital select line. The PMT analog high voltage is controlled by a 0 to +5 V input on the High Voltage control line corresponding to 0 to –1250 V on the PMT.

Overall control of the 914 housing settings is via the computer. An optional manual switching between analog and digital modes and adjustment of the PMT high voltage in analog mode is made by a separate control box.

The 914 has been configured for your application and the PMT is already installed. There are no user serviceable parts in the circuit board housing of the 914.

2. Specifications:

PMT type:	any 28 mm diameter side-on tube
Power supply requirements	-15V @ 50mA/+15V @ 150mA

Analog Mode:

HV adjustment range:	0 -1250 V
Shortest response time :	100 ns
Internal electronic signal amplification:	X100
Electronic amplification linear bandwidth:	0-2 MHz
Internal electronic signal amplification at 100 MHz:	X1
Electrical coupling:	DC
Bandwidth (set by jumpers at the factory):	10 kHz, 30 MHz or 200 MHz

Photon Counting Mode:

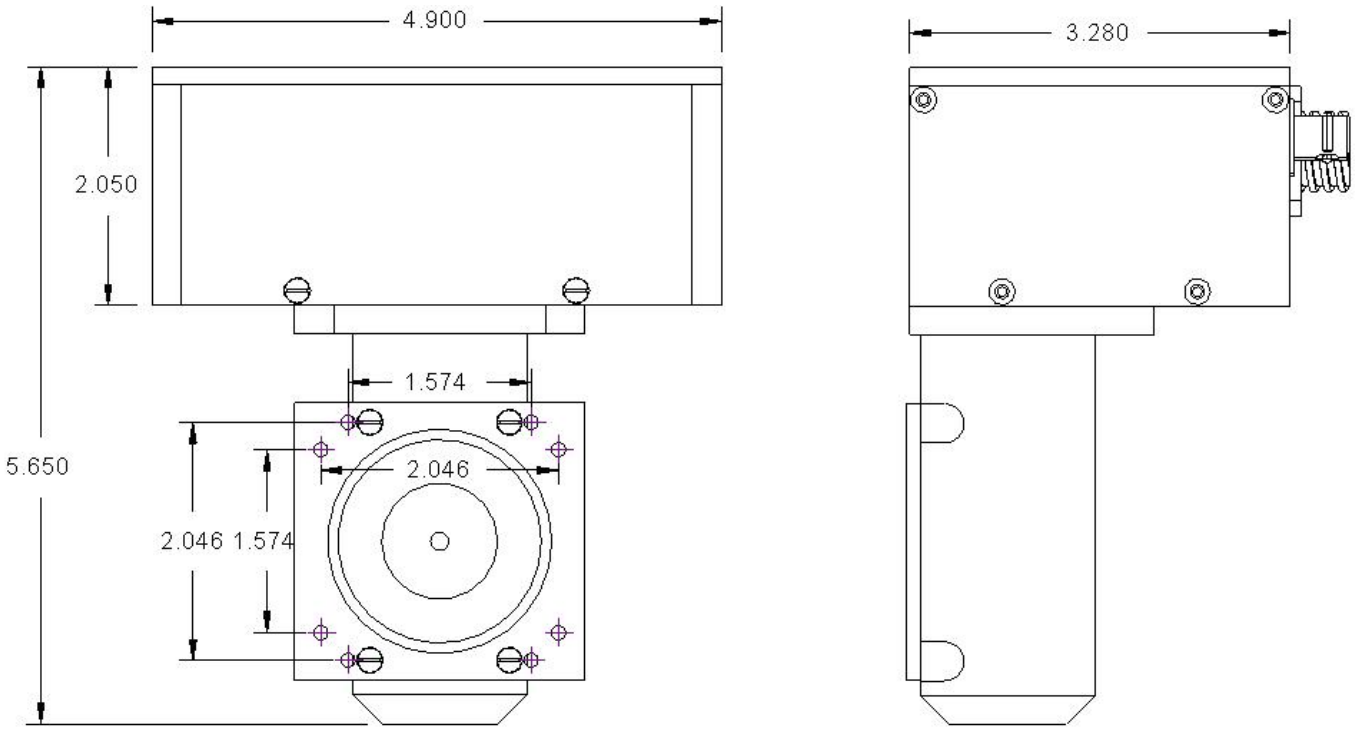
Maximum count rate:	10 million
Absolute linear count rate:	3 million
Linear count rate (-5% deviation):	7 million
Pulse pair resolution:	60ns
Output pulses:	TTL
Output pulse width:	10-40 ns

Typical PMT Spectral Response

Model	**R928**	**R509**	**R1527**
Range	185 – 900 nm	185 – 870 nm	185 – 680 nm
Peak	400 nm	330 nm	340 nm

Overall and mounting holes dimensions

(all dimensions in inches)



Inputs and Outputs

Input:

Power	Power and control	9-pin CPC (circular plastic connector)

Output:

Digital	Digital signal	BNC
Analog	Analog signal	BNC

2. Service

The 914 has been configured for your application. There are no user serviceable parts in the circuit board housing of the 914. High voltage is present inside the housing.

Replacing the photomultiplier tube

To avoid possible damage to the sensitive photomultiplier tube, it is suggested that the new PMT be kept in darkness as much as possible until it is installed in its socket and the housing is closed.

Be careful not to touch the photocathode area of the PMT UV glass envelope. Finger oils may deposit on the surface and these may emit fluorescence when illuminated by incident light. If you do touch the PMT envelope wipe the glass clean with a lint-free tissue dampened with methanol and then with a clean dry tissue.

When removing or installing the PMT carefully grasp the base of the PMT with thumb and index finger and pull down or push up on the PMT while gently moving it side to side by small angles. Do not move the PMT through large angles as you can crack the ceramic insulator base of the PMT socket.

You will need 2.5 mm and 7/64 inch hex keys (Allen wrench; ball end preferred).

1. Exit FelixGX if it is open.
2. Turn off the power on the AS0C-10 box.
3. Disconnect all cables from the 914 housing.
4. Dim or turn off the room lights. An unpowered PMT exposed to bright light can have a high dark count that may take several minutes to hours to dissipate.
5. Use a 2.5 mm hex key to remove the four screws mounting the 914 flange to the slit assembly and pull the 914 housing away from slit assembly.
6. Use a 7/64 inch hex key to remove the three screws mounting the PMT housing to the circuit board housing.
7. Pull the PMT housing away from the PMT and the circuit board housing.
8. Using your thumb and index finger, grasp the base of the PMT and rock it slightly side to side while pulling the PMT out of the socket. Wrap the PMT in bubble wrap, then place it in a box.
9. Remove the new PMT from its packaging. The rib on the indexing pin is on the same side of the PMT as the photocathode, so that when the rib inserts into the notch in the socket base, the photocathode faces the back of the housing (i.e. toward the incident light). Using your

thumb and index finger, grasp the base of the PMT and rock it slightly side to side while pushing the PMT into the socket. Make sure the PMT is fully seated in the socket.

10. Slide the PMT housing over the PMT so that the flange side is aligned with the PMT photocathode (I.e., the flange is opposite from the connectors on the circuit board housing).
11. Use the 7/64 inch hex key to insert and tighten the three screws to mount the PMT housing to the circuit board housing.
12. If the O-ring falls out of the PMT housing or housing flange, put it back in place. If it will not stay in place in the recessed groove around the light hole, use your fingertip to moisten the side of the O-ring that sits in the groove with a thin film of saliva.
13. Use the 2.5 mm hex key to insert and tighten the four screws to mount the 914 flange to the slit assembly.
14. Reconnect the cables removed in step 3.

3. Service Calls to PTI

To aid our Service Department in discussing your questions, as well as to aid in the timely solution of any problems, please assemble as much as possible of the following information before calling PTI:

- Your system serial number, or as many other component serial numbers as possible
- The name of the purchaser or principal investigator, and the company or institution where the instrument is located.
- Your instrument type and hardware configuration (and software version, if applicable)
- The date on which your instrument was installed
- As much detail as possible on the particular chain of events or circumstances that led to the problem. This information should include the complete instrument status and data gathering protocol.
- If possible, be prepared to send sample data and hardware and acquisition setup files as email attachments to PTI service personnel.

Contact PTI Service at
Toll Free: 877-784-4349 US/Canada
Phone: 609-894-4420 Ext 115
Fax: 609-894-1579
Email: PTIService@pti-nj.com

VISIT OUR WEBSITE AT
www.pti-nj.com